

BELLCOMM, INC.

1100 Seventeenth Street, N.W. Washington, D. C. 20036

SUBJECT: Rationale for a Partial Deployment
of ALSEP on the First EVA of a
Manned Lunar Mission - Case 340

DATE: April 16, 1968

FROM: M. T. Yates

ABSTRACT

The question as to the utility of a partial deployment of ALSEP during the first EVA of the lunar landing mission is investigated. It is concluded that it is useful to verify operation of the remote deployment mechanism (RDM) during the first EVA. The result of this would be input for a second EVA go/no-go decision as well as for providing confidence in the RDM should the mission abort before the second EVA.

FF No. 602(A)

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|--|------------|
| (ACCESSION NUMBER) | (THRU) |
| 4 | NONE |
| (PAGES) | (CODE) |
| CR-95465 | |
| (NASA CR OR TM AD NUMBER) | (CATEGORY) |
| AVAILABLE TO NASA OFFICES AND NASA RESEARCH CENTERS ONLY | |

(NASA-CR-95465) RATIONALE FOR A PARTIAL
DEPLOYMENT OF ALSEP ON THE FIRST EVA OF A
MANNED LUNAR MISSION (Bellcomm, Inc.) 4 p

N79-71999

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MEMORANDUM FOR FILE

I. INTRODUCTION

The most recent timelines (Ref. 1) proposed by MSC for the first manned lunar mission include a 2 hour EVA followed 12 hours later by a 3 hour EVA. This second EVA, in which ALSEP is deployed, is not a primary mission objective and, hence, may not be realized on the first manned mission. In view of this possibility, it would seem desirable to consider an alternate way in which the ALSEP deployment procedure can be verified.

II. RATIONALE

The presently conceived scheme for removing ALSEP from the SEQ bay incorporates a remote deployment mechanism (RDM), which allows the astronaut to extract and lower the ALSEP pallets from the SEQ on a boom-pulley mechanism while at a distance of up to 10 feet from the LM. This procedure was proposed to replace the simple manual withdrawal after it was ascertained that one could not guarantee that ALSEP could be reliably deployed throughout the range of possible LM landing attitudes.

The RDM is a fairly complex mechanical assembly consisting of an extensible boom, pulley, ratcheting mechanism, and lanyards. It is conceivable that landing shock, especially on uneven terrain, would cause the RDM to bind or jam and make the ALSEP deployment difficult or impossible.

Since removal of the ALSEP pallets from the SEQ involves an interface with the LM and may be dependent to some degree on the landing dynamics and the local terrain conditions, this part of the ALSEP deployment procedure is the most difficult to verify in earth based simulations. For this reason it would seem desirable to verify the operation of the RDM during the first EVA. The result of this verification would be a useful input for the second EVA go/no-go decision as well as for providing confidence in the RDM should the second EVA (and hence full ALSEP deployment) be scrubbed for other reasons.

A further reason to partially deploy ALSEP on the first EVA is the desirability of short, independent astronaut tasks for the first mission. A complete deployment of ALSEP on the second EVA represents at least a 1 hr 45 min task of extreme complexity. It would be helpful if part of this could be accomplished earlier as a separate and independent task.

III. FEASIBILITY

Partial deployment (that is, deployment up to but not including opening the RTG fuel cask) of ALSEP on the first EVA would mean leaving the pallets exposed on the lunar surface for 12 hours at which time deployment would be completed. This seems to pose no threat to the instruments. The equilibrium temperature of the pallets has been estimated by the author to be less than 70°C and probably more like 35°C. Other environmental hazards (UV, micrometeoroids, etc.) should be no more detrimental to the unloaded pallets than to the deployed instruments.

Estimated time for off-loading the ALSEP pallets is 15 minutes. This could be scheduled by increasing the first EVA (presently planned as 2 hours long) by 15 minutes. Alternatively, it could be left as a contingency operation in the event that the currently assigned tasks are accomplished before the 2 hours are up.

IV. CONCLUSIONS AND RECOMMENDATIONS

In view of the fact that a second EVA (including ALSEP deployment) may not be a primary mission objective on the first manned landing mission, it is recommended that ALSEP be partially deployed on the first EVA to insure that the unloading procedure and the operation of the RDM are verified.

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REFERENCES

1. Minutes of the Third Lunar Surface Operations Planning Meeting, January 19, 1968.